

What is claimed is:

1. A structural reinforcement system for reinforcing and securing an opening in a building or structure, the structural reinforcement system comprising:

a frame defining an opening formed within a building, the frame comprising at least two substantially vertical spaced apart members and at least one substantially horizontal member connected to said substantially vertical members;

at least one channel member connected to one of said substantially vertical frame members, the channel member including a groove formed therein;

a movable panel adapted to move between a non-shear force transmitting position with said opening substantially open and a shear force transmitting position with said opening substantially closed, said movable panel comprising at least one panel member, said panel member including a groove engagement device disposed on opposing ends, said groove engagement device configured to be slidably received within said groove;

at least one panel-restraining device, the panel-restraining device configured to substantially restrain and secure said movable panel in said shear force transmitting position when a force is applied to the frame; and

said movable panel and said channel member connected to said opening and being configured to provide a substantially continuous load path when said movable panel is disposed in said shear force transmitting position.

2. The structural reinforcement system of Claim 1, wherein said panel members include interlocking means for releasably securing said panel members in a substantially coincident plane when said movable panel is in said shear force transmitting position.

3. The structural reinforcement system according to Claim 1, further including a second restraining device configured to be translated between a restraining position and a non-restraining position, wherein said movable panel and said panel-restraining device are engaged in a restraining position.

4. The structural reinforcement system according to Claim 3, further including an automatic closing means to move said movable panel from said open position to said closed position, said automatic closing means further moving said panel-restraining device between the non-restraining position and the restraining position.

5        5.        The structural reinforcement system according to Claim 1, wherein said panel-restraining device includes one or more latch plates attached to a rotatable actuator rod, said latch plate being fixedly attached to said rotatable actuator rod, wherein said latch plate is configured to engage and restrain said movable panel when said movable panel is disposed in said closed position.

10        6.        The structural reinforcement system according to Claim 1, wherein said panel-restraining device includes a continuous latch plate attached to a rotatable actuator rod, said latch plate being fixedly attached to said rotatable actuator rod, wherein said latch plate is configured to engage and restrain said movable panel when said movable panel is disposed in said closed position.

15        7.        The structural reinforcement system according to Claim 6, wherein the latch plate further includes at least one aperture, channel, or slot formed therein and said movable panel further includes at least one pin extending from a first surface, the aperture formed within said latch plate being configured to receive and retain said pin when said movable panel is disposed in said closed position and said latch plate is disposed in a restraining position.

20        8.        The structural reinforcement system according to Claim 6, wherein said latch plate further includes at least one pin extending from a surface of said latch plate, at least one pin being configured to be received within at least one aperture formed within the movable panel.

25        9.        A structural reinforcement system for reinforcing and securing an opening in a structure, the structural reinforcement system comprising:

30        a frame defining an opening formed within a structure, the frame comprising at least two substantially vertical spaced apart members and at least one substantially horizontal member connected to said substantially vertical members;

      at least one first channel member connected to at least one of said substantially vertical frame members;

at least one second channel member coupled to said first channel member, the channel members forming a groove therebetween;

5 a movable panel adapted to move between a non-shear force transmitting position with said opening substantially open and a shear force transmitting position with said opening substantially closed, said movable panel comprising at least one panel member, said panel member including a groove engagement device disposed on opposing ends, said groove engagement device configured to be slidably received within said groove; and

10 at least one panel-restraining device configured to substantially restrain said movable panel in said shear force transmitting position, wherein said movable panel and said channel members are in communication with the opening and configured to provide a substantially continuous load path when said movable panel is disposed in said shear force transmitting position.

15 10. The structural reinforcement system of Claim 9, wherein said panel members include interlocking means for releasably securing said panel members in a substantially coincident plane when said movable panel is in said shear force transmitting position.

20 11. The structural reinforcement system according to Claim 9, further including a second restraining device configured to be translated between a restraining position and a non-restraining position when said panel-restraining device and said movable panel are engaged in a restraining position and closed position.

25 12. The structural reinforcement system according to Claim 11, further including an automatic closing means to move said movable panel from said open position to said closed position, said automatic closing means further moving said panel-restraining device between the non-restraining position and the restraining position.

30 13. The structural reinforcement system according to Claim 9, wherein said panel-restraining device includes one or more latch plates attached to a rotatable actuator rod, said latch plate being fixedly attached to said rotatable actuator rod, wherein said latch plate is configured to engage and restrain said movable panel when said movable panel is disposed in said closed position.

14. The structural reinforcement system according to Claim 9, wherein said panel-restraining device includes a continuous latch plate attached to a rotatable actuator rod, said latch plate being fixedly attached to said rotatable actuator rod, wherein said latch plate is configured to engage and restrain said movable panel when said movable panel is disposed in said closed position.

15. The structural reinforcement system according to Claim 14, wherein the latch plate further includes at least one aperture, channel, or slot formed therein and said movable panel further includes at least one pin extending from a first surface, the aperture formed within said latch plate being configured to receive and retain said pin when said movable panel is disposed in said closed position and said latch plate is disposed in a restraining position.

16. The structural reinforcement system according to Claim 14, wherein said latch plate further includes at least one pin extending from a surface of said latch plate, at least one pin being configured to be received within at least one aperture formed within the movable panel.

17. A structural reinforcement system for reinforcing and securing an opening in a structure, the structural reinforcement system comprising:

a frame defining an opening formed within a structure, the frame comprising at least two substantially vertical spaced apart members and at least one substantially horizontal member connected to said substantially vertical members;

at least one first channel member connected to at least one of said substantially vertical frame members;

at least one second channel member coupled to said first channel member, the channel members forming a groove therebetween;

a movable panel adapted to move between a non-shear force transmitting position with said opening substantially open and a shear force transmitting position with said opening substantially closed, said movable panel comprising at least one panel member, said panel member including a groove engagement device disposed on opposing ends, said groove engagement device configured to be slidably received within said groove;

at least one panel-restraining device for substantially restraining and securing said movable panel in said shear force transmitting position; and

a frame reinforcement device connected to said frame opening wherein, said movable panel and said channel members are configured to provide a substantially continuous load path when said movable panel is disposed in said shear force transmitting position.

18. The structural reinforcement system of Claim 17, wherein said panel members include interlocking means for releasably securing said panel members in a substantially coincident plane when said movable panel is in said shear force transmitting position.

19. The structural reinforcement system according to Claim 17, further including a second restraining device configured to be translated between a restraining position and a non-restraining position when said panel-restraining device and said movable panel are engaged in a restraining position and closed position.

20. The structural reinforcement system according to Claim 19, further including an automatic closing means to move said movable panel from said open position to said closed position, said automatic closing means further moving said restraining means between the non-restraining position and the restraining position.

21. The structural reinforcement system according to Claim 17, wherein said panel-restraining device includes one or more latch plates attached to a rotatable actuator rod, said latch plate being fixedly attached to said rotatable actuator rod, wherein said latch plate is configured to engage and restrain said movable panel when said movable panel is disposed in said closed position.

22. The structural reinforcement system according to Claim 17, wherein said panel-restraining device includes a continuous latch plate attached to a rotatable actuator rod, said latch plate being fixedly attached to said rotatable actuator rod, wherein said latch plate is configured to engage and restrain said movable panel when said movable panel is disposed in said closed position.

23. The structural reinforcement system according to Claim 22, wherein the latch plate further includes at least one aperture, channel, or slot formed therein and said movable panel further includes at least one pin extending from a first surface, the aperture formed within said latch plate being configured to receive and retain said pin when said movable panel is disposed in said closed position and said latch plate is disposed in a restraining position.

24. The structural reinforcement system according to Claim 22, wherein said latch plate further includes at least one pin extending from a surface of said latch plate, at least one pin being configured to be received within at least one aperture formed within the movable panel.

25. The structural reinforcement system according to Claim 17, wherein the frame reinforcing device comprises at least one upper reinforcement device.

26. The structural reinforcement system according to Claim 17, wherein the frame reinforcing device comprises at least one lower reinforcement device.

27. The structural reinforcement system according to Claim 17, wherein the frame reinforcing device comprises at least one upper reinforcement device and at least one lower reinforcement device.

28. The structural reinforcement system according to Claim 27, further including at least one elongated member disposed between and in communication with the upper and lower reinforcement devices.

29. The structural reinforcement system according to Claim 17, wherein said frame reinforcement device is disposed within said opening.

30. The structural reinforcement system according to Claim 17, wherein said frame reinforcement device is disposed upon the side edges of said opening.

31. The structural reinforcement system according to Claim 17, wherein said frame reinforcement device is designed to reduce stress concentrations in the corners of the opening.

5 32. The structural reinforcement system according to Claim 17, wherein said frame reinforcement comprises an upper reinforcement device, the upper reinforcement device configured to be disposed across the substantially horizontal member of the opening.

10 33. The structural reinforcement system according to Claim 32, wherein said frame reinforcement device further includes a lower reinforcement device disposed across the lower portion of the opening and adjacent to the upper reinforcement device.

15 33. The structural reinforcement system according to Claim 17, wherein said frame reinforcement device further includes an anchoring device, the anchoring device configured to anchor the frame reinforcement device to the foundation of the structure.

20 34. The structural reinforcement system according to Claim 17, wherein said first and second channels are configured to be reinforcement devices.

25 35. The structural reinforcement system according to Claim 34, wherein said first and second channels are connected to the frame reinforcement device.